[News * Analysis * Commentary * Controversy]

March 25, 2009 * Vol. 31 * No. 6
www.oncology-times.com

ONCOLOGY TIMES

Publishing for 31 Years

Lippincott Williams & Wilkins
Wolters Kluwer Health

The Oncology & Hematology Source

As Economy Turns, Cancer Centers Employing Watchful Waiting

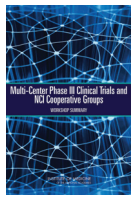
BY ERIC T. ROSENTHAL

The leaders of a sampling of comprehensive cancer centers of varying size, structures, and geographic locales tell how they are faring in the new economic reality. The good news is that so far the recession appears not to have been a detriment to providing continuing quality cancer care. Still, none are taking anything for granted, and continue to take a prudent, "hoping for the best, preparing for the worst" approach.

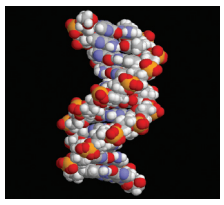
See Page 28

Study: Cash-Strapped Cancer Survivors Skimping on Health Care p. 5

Joe Simone: 'Eric Hoffer's Profound & Continuing Influence on Me' p. 4



IOM Says Rethink Phase III Trials & NCI Cooperative Groups p. 35



ASCO KRAS-Test Guidelines Are First of New Way to Give Clinical Advice p. 41

PERIODICALS

[ALSO]

Ovarian Cancer: 'Dark Side' of IP Chemo in Advanced Disease 9
DCIS: Big Increase in Use of Prophylactic Mastectomy . . 16
GIST Registry Shows Unexpected Practice Patterns 26
ShopTalk 54
POETRY by Caregivers: Connie Achord, RN, BC, OCN . . . 56
Misconceptions Keeping Latinas from Timely Breast-Cancer Treatment 58
Conferences 59

Safer Way Found to Illuminate Nanoparticles

Researchers at the University of California, San Diego, have created silicon flakes that glow brightly, last long enough to slowly release chemotherapy, and break down harmlessly.

"This is the first luminescent nanoparticle that was purposely designed to minimize toxic side effects," the head of the research team, Michael J. Sailor, PhD, Professor of Chemistry and Biochemistry and Professor of Bioengineering, said in a news release.

Many nanoparticles tested in research labs are too poisonous for use in humans, he explained. "This new design meets a growing need for non-toxic alternatives that have a chance to make it into the clinic."

The particles inherently glow, a useful property that is most commonly achieved by including toxic organic chemicals or quantum dots, which can leave potentially harmful heavy metals as a byproduct.

As reported in *Nature Materials* (published online on February 22), testing in mice showed that tumors glowed for several hours and then dimmed as the particles broke down, with levels dropping noticeably in a week and becoming undetectable after four weeks. The study is the first, the authors wrote, to image tumors and organs using biodegradable silicon nanoparticles in live animals.

As described in the news release,

continued on page 34

→NANOPARTICLES

continued from page 33

the particles begin as thin wafers made porous with an electrical current and are then pulverized with ultrasound. Additional treatment alters the physical structure of the flakes to make them glow red when illuminated with ultraviolet light.

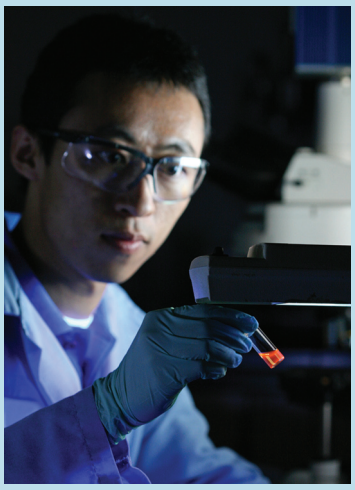
Such luminescent particles can reveal tumors or metastases that are too small to otherwise detect and can also potentially be used to help deliver drugs safely. For example, doxorubicin can stick to the pores and slowly escape as the silicon dissolves.

"The goal is to use the nanoparticles to chaperone the drug directly to the tumor, to release it into the tumor rather than other parts of the body," Dr. Sailor said.

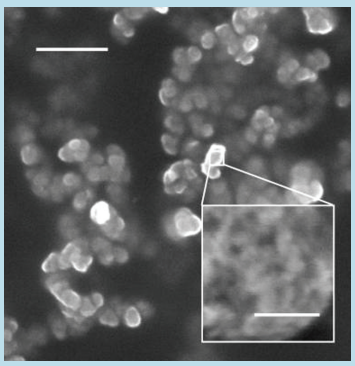
> "Many nanoparticles tested in research labs are too poisonous for use in humans. This new design meets a growing need for non-toxic alternatives that have a chance to make it into the clinic."

Targeted delivery, of course, would allow use of smaller doses. At doses high enough to be effective, when delivered to the whole body, doxorubicin, for example, often has toxic side effects.

At a size of about 100 nanometers, the particles are bigger than many designed to deliver drugs, which can be just a few nanometers across. The larger size contributes to both effectiveness and safety, since larger particles can hold more of a drug. Yet they self-destruct, and the remnants can be filtered away by the kidneys.



USCD researcher Luo Gu with the silicon nanoparticles engineered to glow red under ultraviolet light.



Microscopic view of the silicon flakes designed to deliver drugs and then dissolve away.

The nanoparticles safely illuminate letters on a finger.

In the new study, mice treated with the new nanoparticles showed no lasting changes in the liver, spleen, and kidneys, which help to remove toxins.

Coauthors with Dr. Sailor were first author Ji-Ho Park, PhD; Luo Gu; Sangeeta Bhatia, MD, PhD; Geoffrey von Maltzahn; and Erkki Ruoslahti, MD, PhD.

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